Medical and Psychosocial Services in Drug Abuse Treatment: Do Stronger Linkages Promote Client Utilization?

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Objective. To examine the extent to which linkage mechanisms (on-site delivery, external arrangements, case management, and transportation assistance) are associated with increased utilization of medical and psychosocial services in outpatient drug abuse treatment units.

Data Sources. Survey of administrative directors and clinical supervisors from a nationally representative sample of 597 outpatient drug abuse treatment units in 1995.

Study Design. We generated separate two-stage multivariate generalized linear models to evaluate the correlation of on-site service delivery, formal external arrangements (joint program/venture or contract), referral agreements, case management, and transportation with the percentage of clients reported to have utilized eight services: physical examinations, routine medical care, tuberculosis screening, HIV treatment, mental health care, employment counseling, housing assistance, and financial counseling services.

Principal Findings. On-site service delivery and transportation assistance were significantly associated with higher levels of client utilization of ancillary services. Referral agreements and formal external arrangements had no detectable relationship to most service utilization. On-site case management was related to increased clients' use of routine medical care, financial counseling, and housing assistance, but off-site case management was not correlated with utilization of most services.

Conclusions. On-site service delivery appears to be the most reliable mechanism to link drug abuse treatment clients to ancillary services, while referral agreements and formal external mechanisms offer little detectable advantage over ad hoc referral. On-site case management might facilitate utilization of some services, but transportation seems a more important linkage mechanism overall. These findings imply that initiatives and policies to promote linkage of such clients to medical and psychosocial services should emphasize on-site service delivery, transportation and, for some services, on-site case management.

Key Words. Drug abuse treatment units, substance dependence, delivery of health care, health services needs and demands, mental health service, case management, transportation

Approximately one of every ten Americans suffers from an addictive disorder, and 5.5 million Americans have problems severe enough to warrant addiction treatment (Gerstein and Harwood 1990; Kessler, McGonale, Zhao, et al. 1994). Drug abuse and dependence produce dysfunction in multiple aspects of the lives of addicted people, including their physical and mental health, family situation, employment, finances, and housing. Drug abuse treatment programs usually provide a core of rehabilitative counseling services to address clients' drug use and ancillary medical and psychosocial services to ameliorate the multidimensional problems that drugs cause in their lives (Etheridge, Hubbard, Anderson, et al. 1997). Attention to these diverse problems is essential to quality drug abuse treatment. Research suggests that providing medical and psychosocial services to drug abuse treatment clients improves their overall health and functioning, retention in treatment, and substance use outcomes (McLellan, Arndt, Metzger, et al. 1993; McLellan, Grissom, Zanis, et al. 1997; McLellan, Hagan, Levine, et al. 1998; Rounsaville et al. 1986; Stein, Samet, and O'Connor 1993).

Despite increasing recognition of the multifaceted adverse consequences of addictive disorders and the benefits of multidimensional service delivery, little is known about the ways in which drug abuse treatment programs deliver medical and psychosocial services. Addiction treatment clients face substantial systemic and personal barriers to receiving ancillary medical and psychosocial services (Teitelbaum, Walker, Gabay, et al. 1992); hence, various linkage mechanisms have been proposed for drug abuse treatment programs to overcome these barriers. As will be described in

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more detail, methods of improving client linkages include on-site service delivery, external arrangements of variable formality, case management, and transportation assistance (D'Aunno 1997; Samet, Saitz, and Larson 1996). However, few studies have examined the relative ability of these methods to promote ancillary service utilization. Furthermore, no study has examined these issues in a nationally representative sample of drug abuse treatment units. This article thus examines the extent to which on-site delivery, external arrangements, case management, and transportation promote utilization of medical and psychosocial services in a nationally representative sample of drug abuse treatment units.

CONCEPTUAL BACKGROUND AND HYPOTHESES

This article focuses exclusively on integrative linkages, which we define as structural or programmatic features of the drug abuse treatment unit or its interorganizational relationships designed specifically to integrate medical and psychosocial services with the unit's core function of drug rehabilitation. Assuming that medical and psychosocial services represent processes important to the production of drug rehabilitation, integrative linkages align the drug abuse treatment unit and suppliers of these services across multiple stages of the production process (Kaluzny, Zuckerman, and Rabiner 1998).

Linkage mechanisms vary in form, and exist on a continuum of theoretical efficacy (see Figure 1) (D'Aunno 1997; Oliver 1990; Samet, Saitz, and Larson 1996). The extremes range from the ad hoc, market-based purchase of services from local providers to the complete control and coordination of a fully integrated, centralized service delivery system. This continuum posits that stronger linkage mechanisms (toward the right) lower the barriers ("friction") to actual service delivery. For a given client in the treatment unit, stronger linkage mechanisms increase the probability that the client will utilize services. In organizational terms, stronger linkage mechanisms decrease the uncertainty that these organizations can obtain needed services for their clients . In drug abuse treatment units, sources of the uncertainty surrounding the delivery of medical and psychosocial services are manifold, including problems with insurance, identification of willing providers, clients' personal disorganization, and lack of transportation, among others. In essence, this article empirically tests the proposition that clients in units with stronger linkage mechanisms are more likely to utilize medical and psychosocial services than

clients in units that lack such linkages. Because the configurations of linkage mechanisms are non-exclusive—that is, drug abuse treatment units can use one or more of them simultaneously—we examine hypotheses pertaining to the independent influence of each mechanism on clients' utilization of these services.

On-Site Delivery

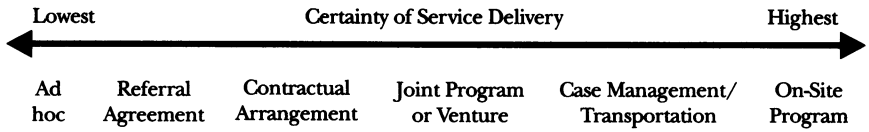
On-site programs effectively augment drug abuse treatment clients' utilization of medical services (Samet, Saitz, and Larson 1996). In addition to overcoming the substantial political, bureaucratic, attitudinal, and financial barriers separating addicted persons from these services (Center for Substance Abuse Treatment 1993; Teitelbaum, Walker, Gabay, et al. 1992; Umbricht-Schneiter et al. 1994), on-site delivery overcomes the problems of geographic separation, client disorganization, and poor motivation that inhibit clients from keeping outside appointments (Friedmann et al. 1999; Umbricht-Schneiter et al. 1994). These features, in concert with formalization, make it likely that on-site programs will increase service utilization across service categories.

> **Hypothesis 1.** The extent of on-site service delivery in drug abuse treatment units will be positively related to utilization of medical and psychosocial services.

External Arrangements

Most units lack the funding and diverse expertise to provide fully integrated, comprehensive services on-site (Friedmann et al. 1999; Schlenger, Kroutil, and Roland 1992). Consequently, most units provide ancillary services through external arrangements designed to link clients to off-site service providers. Ad hoc referral is the most market-based alternative; clients are referred to available providers in the marketplace, with minimal regard for

Figure 1: The Continuum of Integrative Linkage Mechanisms



The arrow represents the level of certainty with which an organization can deliver services to its clients. Clients in units with linkage types toward the left are expected to have a lower probability of service utilization, and towards the right a higher probability.

Source: Adapted from D'Aunno 1997.

whether they obtain needed services or continuity of care (D'Aunno 1997). Referral agreements, another category of informal arrangement, create a simple exchange network in which two or more providers form preferred relationships based on agreed rules of exchange (D'Aunnno 1997; Kaluzny, Zuckerman, and Rabiner 1998). Although referral agreements cost the treatment unit essentially nothing, they are not enforceable and do little to overcome the structural and personal barriers clients face in receiving needed ancillary services (D'Aunno 1997); we anticipate that referral agreements will have little relation to service utilization.

Formal external arrangements include joint programs or ventures and contracts between drug abuse treatment units and external service providers. A joint program or venture involves a business engagement between two or more organizations that combine their interests and resources for a specific purpose, such as developing a needed service. In contractual arrangements the parties sign legally binding agreements about exchanges of resources, personnel, or clients but do not necessarily join together to create new products or services. For example, a drug abuse treatment unit might contract with a local clinic to provide physical examinations and routine medical care to its clients. Units that enter into formal arrangements must make legally binding commitments. In exchange, the formalization of these mechanisms should, in theory, increase the probability of service delivery (D'Aunno 1997).

> **Hypothesis 2.** In drug abuse treatment units, the extent of service delivery through formal external arrangements will be associated with greater utilization of medical and psychosocial services.

Case Management and Transportation

The linkage mechanisms previously described still place the burden for personal organization, appointment keeping, and transportation on the client. These factors may be the most important barriers to service delivery because chronic substance abuse typically produces lifestyle disorganization and financial straits (Teitelbaum, Walker, Gabay, et al. 1992). In this setting, case management facilitates and coordinates the delivery of the diverse services that address the multiple needs of drug-dependent clients (Ridgely and Willenbring 1992). Given the previously described barriers that these clients face, linking clients to needed services is a primary goal of case management in drug abuse treatment units (Ridgely and Willenbring 1992). On-site case management is expected to be most effective in this regard, because case managers within the program, like the staff of any on-site service delivery program

(Umbricht-Schneiter et al. 1994), can find clients who miss scheduled appointments and assist them on an unscheduled basis. Relatedly, units that deliver both on-site and off-site case management have the capability for greater flexibility, individualized care planning, and continuity of care—hallmarks of quality case management services (Ridgely and Willenbring 1992). However, clients of units that provide only off-site case management face the same issues of lifestyle disorganization and lack of unscheduled contact for case management as they do for any external referral.

> **Hypothesis 3.** The extent to which drug abuse treatment units provide on-site case management will be positively related to clients' utilization of medical and psychosocial services.

Transportation Assistance. Because drug abuse treatment clients may lack money for bus- or cabfare, a valid driver's license, or the goodwill of friends or family to drive them, transportation to appointments may be an important barrier to service delivery. Transportation would thus be a natural linkage mechanism in this setting.

> **Hypothesis 4.** The extent to which drug abuse treatment units provide transportation assistance will be positively related to clients' utilization of medical and psychosocial services.

Control Variables: Organizational Characteristics and Clients' Needs

Models to determine the independent influence of the linkage mechanisms must account for other factors related to the extent of service utilization. Previous conceptual and empirical work supports the reasoning that organizational characteristics and needs of the drug abuse treatment population are associated with the degree of a unit's service delivery (D'Aunno and Vaughn 1995). Such factors include the unit's ownership and affiliation, its resources, the mandates to which it is subjected, and its clients' characteristics as indicative of their needs and personal resources (D'Aunno and Vaughn 1995; Friedmann, Alexander, and D'Aunno 1999).

METHODS

Sample

This study uses cross-sectional data from the 1995 wave of the national Drug Abuse Treatment System Survey (DATSS), a panel study of America's

outpatient drug abuse treatment units (D'Aunno 1996). An eligible outpatient unit was defined as a physical facility with more than half of its resources dedicated to non-residential treatment of drug abuse problems. Veterans Affairs and correctional facility programs were excluded.

From the 1988 and 1990 waves of DATSS, 429 programs remained eligible; interviews were obtained in 376 programs (88 percent). In addition to programs recontacted from the earlier waves, the sample was supplemented to provide unbiased representation of the treatment unit population in 1995. The sampling frame for the cross-sectional sample was a subset of the 1994–1995 National Frame of Substance Abuse Treatment Programs, the most complete listing available of the nation's drug abuse treatment units: a total of 32,927 unduplicated programs (Heeringa 1996).

The sampling frame was stratified by treatment modality (methadone or drug-free), ownership (private for-profit, private not-for-profit, or public), and affiliation (hospital, mental health center, or freestanding). For the 1995 supplementation, the frame was stratified on these factors to ensure adequate numbers of private, non-hospital, non-methadone units. A random sample of 972 programs was screened by telephone: only 270 programs were eligible, and 231 (86 percent) of them agreed to be interviewed. All told, a nationally representative, stratified sample of 699 units was contacted in 1995 and 618 (88 percent) participated. The current analysis examines the 597 units with data regarding the delivery of medical and psychosocial services.[1]

Data Collection

Each unit's administrative director and clinical supervisor completed telephone interviews. Directors provided information about the unit's ownership, affiliations, environment, finances, and managed care arrangements. Supervisors provided information about clients, staff, and service delivery. All information was collected for the most recent complete fiscal year, except where noted.

The study team at the University of Michigan's Institute for Social Research (ISR) employed several procedures to ensure high-quality, valid, and reliable telephone survey data (Groves, Biemer, Lyberg, et al. 1988). In preparation for the survey, the study team performed case studies to inform survey development, pretested the survey twice with national samples of more than 40 respondents, extensively trained the experienced ISR telephone interviewers about this particular study, and mailed each director a letter explaining the study. During the data collection, the investigators guaranteed

confidentiality and feedback reports to respondents, conducted live interviewer checks, and used frequent probes and follow-up questions. At the completion of data collection, the investigators conducted checks for response consistency within and between each section of the survey and between the different waves of the survey; these checks indicate high levels of consistency. To verify further the validity of these unit-level data collection methods, the investigators compared the 1990 DATSS data with discharge abstracts from the 1990 Drug Services Research Study (DSRS) (Batten, Horgan, Prottas, et al. 1993). The DSRS abstracted the charts of 2,200 drug treatment clients in 1990. The comparison of DATSS and DSRS demonstrated similarity in several key measures, including average treatment duration (6.1 months versus 6.0 months, respectively), mean number of current clients (100.3 versus 100.9), and the number of paid treatment staff (8.2 versus 8.2). The concordance of the DATSS measurements with chart-based data provides reasonable evidence of their validity.

Dependent Variables

For each of eight service categories (physical examinations, routine medical care, tuberculosis screening, treatment for acute HIV/AIDS conditions, treatment for mental health problems, employment counseling, financial counseling services, and housing assistance), clinical supervisors were asked whether the particular services were available to clients either directly from the unit staff or through arrangements with other providers. These yes/no responses are the dependent variables for first-stage models (not shown) used to calculate lambda, the selection factor in the full models. For each available service category, the clinical supervisor next indicated the percentage of clients who received the service either directly from the unit's staff or through arrangements with other providers. These proportions indicate service utilization, the dependent variable for the multivariate models.

EXPLANATORY VARIABLES

Linkage Mechanism

On-Site Service Delivery. For each available service category, the clinical supervisor reported the percentage of services provided by an outside source. By subtracting this response from 100 percent we calculated a variable indicating the percentage of each service delivered on-site.[2]

External Arrangements. For those services provided by an outside source, we used the clinical supervisor's reports to calculate the percentage of services delivered through (1) an ad hoc arrangement, (2) a referral agreement, (3) a contract, (4) a joint program or venture, or (5) another arrangement.[3] Because few units had a joint program or venture, this category was combined with contractual arrangements into the "formal external arrangement" category. Ad hoc referral is the referent.

Case Management. We used the clinical supervisor's reports to calculate the percentage of case management services delivered in units that had case management available (1) on-site, (2) through an external provider (off-site), or (3) through both on-site and off-site providers.[4] Referent units provided no case management.

Transportation. After indicating whether transportation assistance was available in their unit, clinical supervisors reported the percentage of the unit's outpatient substance abuse clients who received transportation assistance in the previous fiscal year.

Control Variables

Because the organizational characteristics of a treatment unit can influence its service patterns (D'Aunno and Vaughn 1995; Friedmann, Alexander, and D'Aunno 1999), our multivariate models control for potentially confounding organizational features:

Ownership and Affiliation. Unit directors' responses about the profit status of the treatment units' owners were dummy-coded (0 = no, 1 = yes) as two variables—private non-profit and private for-profit—with public ownership as the referent category. Affiliation with a hospital or mental health center was similarly dummy-coded, with freestanding or other affiliation as the referent category.

Resources. Clinical supervisors reported the number of clients treated by the unit in the past fiscal year (unit size). Unit directors reported the initial year of operations, and unit age in 1995 was calculated. The number of clients per year divided by the number of full-time equivalents (FTEs) employed by the unit constituted the client-staff ratio, a proxy for caseload. Unit directors reported multiple sources of revenue, which were added together to form total revenue.

Mandates. Unit directors reported whether the unit provided methadone treatment (0 = no, 1 = yes), whether the unit had Joint Commission on Accreditation of Healthcare Organizations (JCAHO) accreditation (0 = no,

1 = yes), and whether managed care arrangements required coordination of care with health care or social service providers (0 = no, 1 = yes).

Client Characteristics. Clinical supervisors reported the percentage of female, African American, dually diagnosed, HIV-infected, managed care–insured, and unemployed clients in the past fiscal year. Reports of the percentage of the unit's clients in each age decade were used to estimate their mean age.

Statistical Methods

The unit of analysis was the treatment unit. Except for description of the sample, we used weights to compensate for the stratified sampling design (Heeringa 1996). To examine the effects of on-site care, external arrangements, case management, and transportation on the proportion of clients who received each service, we used a hierarchical modeling strategy. We first generated eight separate generalized linear mixed models of the logit of the proportion of clients who received each service (with variances adjusted for overdispersion) including only the analytic variables of interest (McCullagh and Nelder 1989; SAS Institute 1990). These models were our base models. To address concerns about selection bias, we next used a two-part estimation procedure to correct for bias that might result from differential availability of services. Because information about linkage mechanism and service utilization exists only for those units in which the service is available, selection bias might result if differences between units that do and do not offer the service were correlated with extent of service delivery. We therefore generated two-stage models that first performed probit regressions in the entire sample of units to estimate the likelihood that each service was available. For each service, we created a selection bias parameter (lambda) that summarized information about the factors that influenced service availability (yes/no) and, consequently, observation of the dependent variable in the second stage (Breen 1996). We added the organizational control variables and lambda to the base models to create the full models. All significance tests were two-tailed.

RESULTS

Descriptive Findings

Of the 597 units in the sample, 14 percent were private for-profit organizations, 62 percent were not-for-profit, and 24 percent were publicly owned.

Eighteen percent were affiliated with a hospital, and 18 percent with a mental health center; 64 percent were freestanding or otherwise affiliated. The units served a mean (± s.d.) of 567 ± 751 clients in the previous fiscal year, and total revenues averaged $519,470 ± $895,809. Methadone was available in 123 units (21 percent). One hundred forty units (24 percent) were JCAHO accredited.

Nationwide, among the various services in the medical category, a range of 6 percent to 38 percent of units had on-site services available to their clients, and 5 percent to 35 percent of the units provided more than half of their clients with on-site medical care. Mental health care was available on-site in 56 percent of all units, and 52 percent provided these services to over half of their clients. Among the various social services, on-site services were available in the range of 19 percent to 46 percent of units, but only 17 percent to 40 percent provided these services to more than half of their clients.

Of the units that provided services at all (see Table 1), the majority of units used external arrangements to deliver medical services. Joint programs or ventures were uncommon, with fewer than 4 percent of units making medical services available through that mechanism. More units used joint programs or ventures to provide psychosocial services, with 8 percent of units reporting such a mechanism to provide mental health care or employment counseling and 15 percent to provide housing assistance. Units made formal contractual arrangements with outside providers to provide relatively few services. Most units used informal mechanisms: referral agreements or ad hoc referral.

Overall, case management was available on site in 56 percent of all units, off site in 16 percent, and both on site and off site in 6 percent. Where on-site case management was available, a mean (± 1 s.d.) of 69 ± 36 percent of clients received it; off site 36 ± 34 percent of clients received case management; and when units had both on- and off-site case management, 66 ± 41 percent of clients received it. Transportation was available in 56 percent of all units. In units that offered transportation, 29 ± 31 percent of clients received it, or 16 ± 27 percent of clients overall.

Relationship Between Linkage Mechanisms and Service Utilization

The two-stage models supported Hypothesis 1 (Table 2).[5] The extent of on-site delivery was significantly associated with greater utilization of physical examinations, tuberculosis screening, HIV/AIDS treatment, mental health

Table 1: Prevalence of Linkage Mechanisms Among Units with Medical and Psychosocial Services Available

	Medical Services				*Psychosocial Services*			
Linkage mechanism available, N (%)	*Physical Examination* N = 478	*Routine Med. Care* N = 366	*Tuberculosis Screening* N = 347	*HIV/AIDS Treatment* N = 123	*Mental Health Care* N = 519	*Employment Counseling* N = 454	*Financial Counseling* N = 273	*Housing Assistance* N = 253
On-Site Delivery	228 (48)	145 (40)	151 (44)	36 (30)	336 (65)	277 (61)	168 (62)	114 (45)
External Arrangements								
Joint program or venture	16 (3)	9 (3)	17 (5)	5 (4)	43 (8)	37 (8)	4 (1)	17 (15)
Contracts	50 (11)	24 (7)	11 (3)	2 (1)	21 (4)	16 (4)	3 (1)	6 (3)
Referral agreement	144 (31)	125 (35)	131 (38)	56 (46)	179 (35)	145 (32)	61 (22)	69 (28)
Ad hoc	100 (21)	92 (26)	62 (18)	32 (27)	92 (18)	99 (22)	45 (17)	59 (24)
Other arrangements	66 (14)	76 (21)	22 (6)	9 (8)	137 (27)	55 (12)	38 (13)	35 (13)
Case Management								
On-site	271 (58)	211 (59)	196 (57)	80 (66)	286 (56)	247 (55)	162 (60)	148 (58)
Off-site	83 (18)	64 (18)	58 (17)	15 (13)	91 (18)	77 (17)	38 (14)	44 (18)
Both on-site and off-site	34 (7)	31 (9)	30 (9)	13 (10)	42 (8)	41 (9)	30 (11)	27 (11)
No case management	83 (18)	55 (15)	61 (18)	14 (11)	92 (18)	84 (19)	41 (15)	34 (13)
Transportation Assistance								
Yes	293 (62)	239 (65)	235 (68)	93 (75)	310 (60)	275 (61)	175 (64)	204 (81)
No	184 (39)	127 (35)	112 (32)	30 (25)	206 (40)	179 (39)	98 (36)	49 (19)

care, employment counseling, and financial counseling. The small numbers of units with formal external arrangements limited our power to test Hypothesis 2, but formal external arrangements were associated with increased delivery of employment services. As expected, referral agreements, which were present in a large proportion of the units, were not related to service utilization. Hypothesis 3 was weakly supported; on-site case management was not related to clients' use of medical or mental health services, but was positively correlated with their utilization of financial counseling and housing assistance. Off-site case management had a positive relationship with housing assistance in the full model but a negative relationship with tuberculosis screening. Clients in units with both on- and off-site case management had increased utilization of routine medical care and financial counseling only. However, Hypothesis 4, concerning transportation assistance, was supported in the full models for physical examination, routine medical care, employment counseling, financial counseling, and housing assistance.

Because one might expect transportation assistance to have stronger effects in units with more case management, we performed supplemental analyses to explore for joint effects between these mechanisms. Interaction terms between the level of transportation assistance and the availability of on-site case management were significant for the utilization of tuberculosis screening (parameter estimate, [β], 0.094; $p = .04$) and employment counseling (β, 0.042; $p = .03$). Interactions between transportation and off-site case management were significant for utilization of physical examinations (β, 0.097; $p = .04$), tuberculosis screening (β, 0.131; $p = .04$), and employment counseling (β, 0.077; $p = .004$). Analogous exploratory analyses revealed no significant interactions between these mechanisms and the external arrangements.

The base models (not shown) produced results that were similar to, but stronger than the full models. For example, the parameter estimate per 10 percent (β_{10}) for on-site delivery in the model of physical examinations was 0.357 in the base model versus 0.164 in the full model (see Table 2). Other findings in the base models lost statistical significance in the full models. On-site delivery was a significant correlate of routine medical care utilization (β_{10}, 0.156; $p = .003$) in the base model but not in the full model. Similarly, transportation assistance was associated with delivery of tuberculosis screening (β_{10}, 0.378; $p = .0001$), and case management on- and off-site was significantly related to mental health care (β_{10}, 0.091; $p = .04$) and to employment counseling (β_{10}, 0.136; $p = .03$) in the base models.

Table 2: Multivariate Models of the Association Between Linkage Mechanisms and Clients' Utilization of Medical and Psychosocial Services

	Parameter Estimate							
	Medical Services				*Psychosocial Services*			
	Physical Examination	*Routine Medical Care*	*Tuberculosis Screening*	*HIV/AIDS Treatment*	*Mental Health Care*	*Employment Counseling*	*Financial Counseling*	*Housing Assistance*
Linkage mechanism (per 10%)†								
On-site delivery	.164***	.053	.336***	.148***	.056**	.212***	.197***	.052
External arrangements								
Formal external arrangement‡	.038	.026	.159	.042	.001	.177***	.113	−.037
Referral agreement	.009	−.008	.060	.016	−.003	.050	.074	.012
Other mechanisms	−.045	−.051	.054	−.022	−.019	.039	.065	−.000
Case management§								
On-site	.008	.072*	−.002	.006	.008	.043	.117***	.101***
Off-site	.080	−.173	−.555**	−.015	−.035	.026	−.025	.238***
Both on-site and off-site	.092	.202**	.004	−.029	.054	.130*	.328***	.092
Transportation assistance	.253***	.308***	.182	.024	−.001	.136**	.190**	.361***
Control variables								
Ownership††								
Private not-for-profit	.114	−.158	1.455	−.648**	.197	−.073	.199	2.336***
Private for-profit	.744	−.639	4.700*	.431	.373	.104	−.885	5.511**
Affiliation‡‡								
Mental health center	−1.041	−.800	−.118	−.580*	−.111	−.104	−2.492*	−1.140*
Hospital	.834	1.752	.481	.121	−.494	.375	−2.489**	2.244**

Resources								
Unit size (per 100 clients)	−.030	−.050	−.030	−.030	−.000	−.010	.250**	−.040*
Unit age (per 5 years)	−.178	−.506	−.342	−.017	−.081	−.086	.285	.046
Staff–client ratio	.001	−.002	.010	.003	−.000	.000	−.041*	.014***
Total revenue (per $1,000,000)	.086	.613	−.568	.155	−.076	−.105	.022	−.461**
Mandates								
Methadone treatment	2.886***	.637	1.966	−.586	−.096	−.006	−1.746	−.085
JCAHO certification§§	1.033*	−.202	.173	.114	.191	−.803	3.204*	.584
Managed care requirement†††	.083	.170	−.018	−.212	−.057	−.290	2.010**	−.877***
Client characteristics (per 10%)								
% Women	.039	.126	.010	.023	.048	−.076	.578*	−.312**
% African American	.050	.216***	.055	−.043	−.021	.050	−.043	−.078
% Dual diagnosis	−.115	.166	.010	.034	.298***	−.115**	.186**	.079
% HIV-infected	.488**	.536	.639	.176	.082	−.004	.683*	−.621***
% Managed care–insured	−.088	−.193	−.425***	.001	.017	−.001	−.415**	.077
% Unemployed	.211**	.194	.037	.021	−.023	.211***	−.333	−.501**
Mean client age	.032	−.015	.058	−.015	−.008	.019	−.266**	−.070**
Lambda‡‡‡	−.826	4.850	−2.350	−1.256	−1.611**	−.709	19.007**	−9.126***
Intercept	−2.104	−5.569	−1.383	−1.205	−1.637**	−2.121	−14.37**	9.426*
N	411	314	301	108	439	388	227	214

(*continued*)

Table 2: *Continued*

	Parameter Estimate							
	Medical Services				*Psychosocial Services*			
	Physical Examination	*Routine Medical Care*	*Tuberculosis Screening*	*HIV/AIDS Treatment*	*Mental Health Care*	*Employment Counseling*	*Financial Counseling*	*Housing Assistance*
Deviance	90.20	75.86	55.74	26.43	110.96	90.27	48.40	41.01
Scaled deviance	90.05	71.33	58.46	26.40	101.18	82.99	45.59	38.59
Pearson chi-square	45.79	38.83	28.44	17.53	61.36	46.86	25.19	23.62
Scaled Pearson chi-square	45.71	36.51	29.83	17.46	55.95	43.08	23.72	22.22
Extra-dispersion scale	1.002	1.064	.954	1.004	1.097	1.088	1.062	1.063

* $p < .10$; ** $p < .05$; *** $p < .01$.

Note: From generalized linear models of the logit of the proportion of clients who received the service with variances adjusted for overdispersion. These models include the linkage mechanism, control variables, and sample selection factor (lambda) generated from the first-stage models (data available on request).

†Ad hoc referral is the referent category.

‡Formal external arrangements include joint programs or ventures, or contractual arrangements.

§No case management is the referrent category.

††Public ownership is the referent category.

‡‡Freestanding or other affiliation is the referent category.

§§Joint Commission on Accreditation of Health Care Organizations.

†††Managed care arrangement requires coordination of medical and social services for outpatient drug abuse treatment clients (Yes/No).

‡‡‡Lambda is the selection parameter generated from the first-stage models (data available on request).

DISCUSSION

Studies of convenience samples of drug abuse treatment units have found that few such units offer medical and psychosocial services, and that clients' overall receive a minimal level of these services (Etheridge et al. 1995; McLellan, Grissom, Zanis, et al. 1997; Widman, Platt, Lidz, et al. 1997). Our descriptive findings confirm the low utilization of important medical and psychosocial services in a nationally representative sample of drug abuse treatment units. Although a substantial minority of units has some on-site services available to clients, most use informal external arrangements—referral agreements or ad hoc referral—to deliver these services.

Our analytic findings suggest that the ability of on-site service delivery to promote utilization of medical and psychosocial services, previously shown in small studies, may be generalizable across the American drug abuse treatment system. For example, Umbricht-Schneiter and colleagues (1994) found that 92 percent of clients randomized to on-site delivery received medical services compared to only 35 percent of clients sent by referral agreement to a local clinic. Other studies have affirmed that on-site delivery effectively links clients to ancillary services (McLellan, Arndt, Metzger, et al. 1993; McLellan, Grissom, Zanis, et al. 1997; Rounsaville et al. 1986).

We could detect no advantage of formal external arrangements (joint programs/ventures and contractual arrangements) over ad hoc referral in terms of service utilization in this environment. However, the small number of units with formal external arrangements limited the study's power to detect this relationship. Employment counseling was one exception. Although formal arrangements create more reliable linkages in theory, no prior empirical research has examined the association between formal arrangements and ancillary service utilization in addiction treatment units. Umbricht-Schneiter and colleagues (1994) suggested that unscheduled contact between medical staff and clients was essential to the effectiveness of their on-site model, encounters that would be absent in any decentralized model. Although formal external arrangements have been offered as alternatives to on-site delivery, more research is needed to discern whether they are worth the resources and loss of autonomy to treatment units (D'Aunno 1997).

The weak association between case management and ancillary service utilization here is in contrast to the few published studies of case management in the substance abuse field. In the Alcohol, Drug Abuse, and Mental Health Administration/Health Resources Services Administration Linkage Demonstration, 97 percent of referred clients who were case managed for

seven or more months received primary care services versus 58 percent who were case managed for one month or less, but this evaluation did not control for the greater opportunity for service delivery associated with a client's longer contact with the treatment system (Schlenger, Kroutil, and Roland 1992). More rigorous investigations have also found positive effects of case management on utilization of health and psychosocial services (Blank et al. 1996; Shwartz et al. 1997; Siegal, Fisher, Rapp, et al. 1996). A recent study of public addiction treatment programs found that on-site case management and contractual arrangements increased medical, psychiatric, and employment service utilization two- to threefold over ad hoc referral (McLellan, Hagan, Levine, et al. 1998). These studies were performed in selected units with funded initiatives or research protocols. In contrast, our data suggest that case management may facilitate ancillary service utilization to a lesser degree in naturalistic settings. In the real world, case management may lack the standardization, rigor, and focus of interventions developed for a funded policy initiative or research protocol. Housing assistance and financial counseling appear to be important exceptions, consistent with the literature supporting the value of case management for indigent clients with housing needs (Sosin, Bruni, and Reidy 1995). Notably, off-site and combined on- and off-site case management appeared to have stronger relationships with housing assistance and financial counseling, respectively, than did on-site case management. Future theory development regarding service integration and case management should address this suggested relationship between off-site case management and the delivery of human services not directly related to health.

Our results also suggest that transportation assistance is an important linkage mechanism in this setting. Few studies have examined the influence of transportation on service delivery. Patients often cite transportation problems as significant barriers to needed health care services (Guidry et al. 1997; Marcus, Crane, Kaplan, et al. 1992; Musey, Lee, Crawford, et al. 1995), but no published study has examined transportation in the substance abuse treatment context. Exploratory analyses of the interactions between transportation and case management suggest that these linkage mechanisms may be synergistic for some services. The organization, costs, and effectiveness of transportation assistance clearly warrant further study.

These analyses have several limitations. First, we have no client-level information about service utilization, only unit-level reports from clinical supervisors. Although this method of unit-level data collection has been validated against chart-abstracted data for other measures in this population,

including clients' average length of stay and methadone dosage, the accuracy of these reports is unknown (Batten, Horgan, Prottas, et al. 1993). Second, ascertainment bias might have augmented the reported service utilization in units that provided on-site services because clinical supervisors of those units might have had more information about their clients' receipt of services. Third, because the two-stage modeling approach is sensitive to violation of the functional form assumption used in identification, our correction for selection bias may not be robust. Fourth, these cross-sectional analyses cannot determine causal direction, that is, whether stronger linkages increase service utilization or vice-versa.

Despite its limitations, this study suggests several challenges for policy and future research. On-site delivery seems the most reliable mechanism to link drug abuse treatment clients to services, but some investigators have raised concerns about its cost-effectiveness (Kraft, Rothbard, Hadley, et al. 1997)). Meanwhile, formal external arrangements such as joint programs/ventures or contracts, promoted as less costly alternatives to on-site care (D'Aunno 1997; Samet, Saitz, and Larson 1996), do not appear to be strongly related to service utilization. Finally, although case management is popular across the drug abuse treatment system, transportation may be a more important linkage mechanism. These findings suggest that initiatives, grants, and organizational policies to promote the linkage of addiction treatment clients to medical and psychosocial services should emphasize on-site delivery, transportation, and for some social services, on-site case management. Future research should further explore the effect of linkage mechanisms on service utilization, as well as the costs and outcomes associated with better linkages to medical and psychosocial services.

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NOTES

1. In the first-stage analyses of service availability, listwise deletion of missing values reduced the sample size from 597 possible cases to approximately 501 cases. We compared service availability and utilization in the deleted cases using chi-square and independent sample *t*-tests, respectively. We detected

no significant differences between the deleted cases and those included in the analyses.

2. We treat the terms "inside," "on site," and "centralized" as synonymous. Thus, these terms refer to the location of the services and not the employment status (full-time, part-time, consultant) of the staff members. However, analyses not shown demonstrated strong associations between the staffing of professionals qualified to deliver these services (e.g. physicians and nurses) and on-site delivery (e.g. routine medical care).
3. Because we hypothesized that increases in service delivery through a particular external arrangement would increase overall service utilization, we needed to quantify the percentage of services delivered off site through each arrangement. In order to do so, we assumed that the proportion of services delivered by an outside source was delivered through the indicated linkage mechanism. For example, if a supervisor indicated that 70 percent of routine medical care services were provided by an outside source and that these services were provided mostly through a referral agreement, we attributed 70 percent of the services to a "referral agreement" arrangement, 30 percent to on-site care, and zero percent to the other arrangements. Our results were unchanged when we assigned 51 percent of the services provided by an outside source to the arrangement identified as providing most of the services and divided the rest evenly between the remaining arrangements.
4. For units in which case management was available, the respondent indicated the percentage of clients for whom case management was performed, and whether a staff person from the unit, someone from outside the unit, or both performed case management. We attributed the proportion of case management delivered to the indicated location. For example, if 80 percent of clients received case management, and only on-site case management was available, we assumed that an on-site program or provider had case managed the entire 80 percent of clients. If the supervisor indicated instead that only off-site case management was available, we assumed that an off-site provider had case managed the entire 80 percent of clients. Finally, if the supervisor reported that case management was available both on- and off site, we attributed the 80 percent of clients to a third variable for units that provided both on-site and off-site case management.
5. First-stage probit models examined the availability of medical and psychosocial services in the units either on site or through an arrangement with outside providers (data available on request). In general, units that had medical services available had public rather than private ownership, greater total revenue, a lower client-staff ratio, a managed care arrangement that required coordination of medical and social services, and more unemployed clients (Friedmann et al. 1999). Employment services were more available in units with a larger size, JCAHO accreditation, and a greater percentage of women clients. Financial counseling was more available in units with a larger size, a lower client-staff ratio, JCAHO accreditation, a managed care requirement to coordinate social services, more women clients, more unemployed clients,

and an older clientele. Units with housing assistance available had public ownership, a managed care requirement to coordinate services, more women, and more unemployed clients. These models generated lambda, the selection factor in the full model.

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